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HARNESS, DICKEY & PIERCE, P.L.C.				
P.O. BOX 828				
BLOOMFIELD HILLS, MI 48303				
EXAMINER				
LAZORCIC, JASON L				
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03/25/2008		PAPER		

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/783,979

Applicant(s)

ASUKE ET AL.

Examiner

JASON L. LAZORCIK

Art Unit

1791

Period for Reply -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 December 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1, 2, 4, 6 and 8 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1, 2, 4, 6 and 8 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-8508)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 1, 4, 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mitsumori (US 6,230,722 B1).

Mitsumori teaches a wet treatment method and apparatus for treatment of "large-sized substrates such as ... a substrate for liquid crystal" (Column 1, lines 14-17). As depicted in the instant reference figure 11A (see below). Mitsumori teaches that the substrate (1) is subjected continuous plural types of treatments wherein the substrate is selectively held above treatment units (2cB, 2bB, 2AB) with the surface targeted for treatment facing downward and said units operating upward. It is evident from the figure that excess liquid applied to the surface targeted for treatment is permitted to "fall away from the surface after being applied to the surface".

FIG. 1

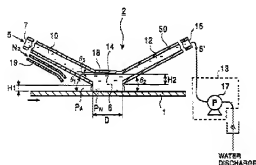
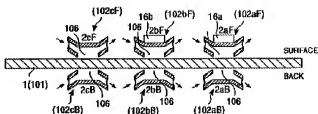


FIG. 11A



In accordance with Applicants particular claimed nozzle element, it is understood that said nozzle comprises the following particular structural features; 1) a nozzle for directing a fluid at an incident angle of less than 45 degrees with respect to the treatment surface plane, 2) a fluid recovery path which is normal to the treatment surface, and 3) 1st and 2nd top end surfaces which provide a predetermined gap between the nozzle and the treatment surface wherein at least the 2nd top end surface comprises an "inclined surface".

Mitsumori teaches several embodiments of "fluid saving type fluid feed nozzles" including a particular embodiment (see fig 1 excerpt above) which comprises an introducing path (10) and discharge path (12).

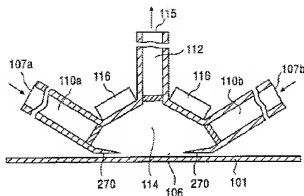
With respect to the claimed relative geometry between the inlet nozzle and the recovery path, the reference indicates that the angle of incidence between the

introducing or discharge path and the substrate (1), θ_1 and θ_2 respectively, can each be varied between 0 and 90° (Column 14, lines 3-8). Where the discharge path or "recovery path" presents a $\theta_2 = 90^\circ$, the nozzle is understood to present a recovery path formed by an inclined end surface of the nozzle (18) and an opposite surface (e.g. discharge path (12) wall which is distal from introducing path (10)) which is perpendicular to the surface targeted for treatment (1).

Regarding the claimed 1st and 2nd top end surface structures and with particular reference to the nozzle structure set forth in the figure 31A excerpt below, Mitsumori teaches the following;

"an inner extension 270 provided on the peripheral edge of the opening section 106, from the peripheral edge toward inside, of which the outer surface is in parallel with the treated surface of the object to be wet-treated 101...When such an inner extension 270 is provided, it is possible to prevent air from the open air side from being entangled into the wet treatment liquid, since the wet treatment liquid in contact with the object to be wet-treated 101 communicates with the open air only through a very small gap between the object to be wet-treated 101 and the inner extension. It is also possible to prevent leakage of the wet treatment liquid to the open air side.:" (§211-212)

FIG. 31A



It follows that Applicants claimed nozzle structure represents a straight forward combination of known features, namely a recovery path perpendicular to substrate surface and inner extensions (270) or 1st and 2nd top end surfaces, to yield a predictable outcome. Although the Mitsumori reference does not expressly provide for the claimed nozzle structure with first and second top end surfaces, it would have been obvious for one of ordinary skill in the art to incorporate the inner extensions (270) onto the disclosed nozzle having a recovery path perpendicular to the treatment surface. Such a modification would have been obvious for one of ordinary skill in the art seeking to "prevent air from the open air side from being entangled into the wet treatment liquid" as set forth by Mitsumori above. Any other minor structural distinctions between the claimed nozzle and that provided for in the prior art, should Applicant argue their existence, are understood to represent engineering design choices that would have been obvious to one of ordinary skill in the art at the time of the invention. As such, said differences are insufficient to patentably distinguish the claimed nozzle from that of the prior art absent any evidence to the contrary.

Mitsumori teaches that a sensor measures the distance between the nozzle and the substrate and provides feedback measurements to an actuator which provides for a constant separation distance (H1) (Column 14, lines 35-51). From the foregoing, it is understood that the "top end surfaces" of the nozzle are "disposed with a predetermined gap from the surface targeted for treatment". Finally, the reference teaches that the nozzle includes a pressure controller(13) which "comprises a reduced pressure pump provided on the discharging port side (15) (Column 13, lines 16-17). The provision of a reduced pressure pump is understood to encompass Applicants embodiment wherein "the recovery path is evacuated to a pressure that is less than atmospheric pressure"

Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mitsumori (US 6,230,722 B1) as applied to claim 1 and further in view of Goodwin (US 5,324,155).

Mitsumori is silent regarding the structural details of the transport device and therefore fails to teach that the transport device described for transferring the substrate between treatment chambers should provide a suction portion to suction and hold the surface targeted for holding, which is opposite the surface targeted for treatment. Mitsumori further fails to explicitly indicate that transport device (855) comprises a guide component for guiding the holding portion in the carrying direction and a driving portion for transferring the holding portion along the guide component. Goodwin teaches a wafer handling system including a pair of robot arms and a drive portion with a plurality

Art Unit: 1791

of ports providing a lifting action for a substrate by utilizing the Bernoulli principle. The device provides "low pressure" or a suction between the device and the surface of the substrate without contacting the substrate. I

It would have been obvious to one of ordinary skill in the art at the time of the invention to utilize a handling system in accord with the Goodwin apparatus as the transport device in the Mitsumori process. This would have been an obvious substitution to anyone seeking to minimize the possibility of damaging a fragile substrate by direct contact with the handling system or transport device.

Claims 1, 4, 6, and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakamura (US 6,921,148) in view of Mitsumori (US 6,230,722 B1).

With particular respect to Claims 1 and 6, Nakamura teaches a method of manufacturing the substrate of a display device wherein the substrate is selectively held by a carrier and carried along the carry direction (column 76, Lines 37-41) and through various process chambers wherein the object is subjected to sequential different treatments. As with any apparatus, the individual chambers may be disassembled and replaced at will.

With respect to Claims 4 and 8, Nakamura teaches a plasma processing process (Column 76, Lines 7 to Column 80, Line13) which reads on the claimed cleaning treatment unit and surface modification treatment unit. The disclosed liquid drop

discharge process (column 86line65 – Column 87, line12), the drying process (Column 87, line 42-43), and the heat processing step (Column 88, lines35-40) are understood to read upon the liquid agent application treatment unit, drying treatment unit, and annealing treatment unit, respectively.

While Nakamura sets forth the fundamental process steps in accord with the claimed invention and an apparatus for the performance of these steps, the reference fails to explicitly indicate that the treatment surface faces downward and that the treatment units are operated upward. Nakamura is further silent regarding the particular details of the cleaning treatment unit as presently claimed.

Mitsumori teaches a wet treatment method and apparatus for treatment of “large-sized substrates such as ... a substrate for liquid crystal” (Column 1, lines 14-17) which one of ordinary skill would recognize as directly relevant to the Nakamura teachings. Mitsumori teaches a variety of “fluid saving type fluid feed nozzles” including a particular embodiment (see fig 1 excerpt below) which comprises an introducing path (10) and discharge path (12). The reference indicates that the angle of incidence between the introducing or discharge path and the substrate (1), θ_1 and θ_2 respectively, can each be varied between 0 and 90° (Column 14, lines 3-8). Where the discharge path or “recovery path” presents a $\theta_2 = 90^\circ$, the nozzle is understood to present a recovery path formed by an inclined end surface of the nozzle (18) and an opposite surface (e.g. discharge path (12) wall which is distal from introducing path (10)) which is perpendicular to the surface targeted for treatment (1). Mitsumori further teaches the inclusion of inner extensions (270) or first and second top end surfaces. Combination of

Art Unit: 1791

these features, namely a recovery path perpendicular to the substrate surface and the inner extensions (270) has been set forth explicitly above.

FIG. 1

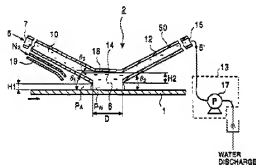
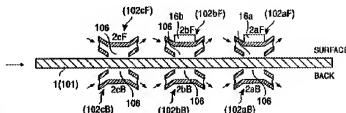


FIG. 11A



Mitsumori teaches that a sensor measures the distance between the nozzle and the substrate and provides feedback measurements to an actuator which provides for a constant separation distance ($H1$) (Column 14, lines 35-51). From the foregoing, it is understood that the "top end surfaces" of the nozzle are "disposed with a predetermined gap from the surface targeted for treatment". Finally, the reference teaches that the nozzle includes a pressure controller(13) which "comprises a reduced pressure pump provided on the discharging port side (15) (Column 13, lines 16-17). The provision of a reduced pressure pump is understood to encompass Applicants embodiment wherein "the recovery path is evacuated to a pressure that is less than atmospheric pressure"

As depicted in the instant reference Figure 11A, Mitsumori disclosed particular embodiments wherein the surface targeted for treatment faces downward and wherein the nozzle is operated to apply treatment in an upward facing direction. Further Mitsumori teaches that the disclosed nozzle provides substrate treatment with "under a

tenth the conventional consumption, and allow to obtain a higher cleanliness than conventional one". In accordance with the Mitsumori disclosure, it would have been obvious to one of ordinary skill in the art at the time of the invention to substitute the disclosed nozzle for that presented in the Nakamura reference. This modification would have been obvious to one of ordinary skill in the art seeking to reduce reagent consumption and reduced substrate contamination.

Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nakamura (US 6,921,148) and Mitsumori (US 6,230,722 B1) as applied to claim 1 above, and further in view of Goodwin (US 5,324,155).

Nakamura is silent regarding the structural details of the transport device and therefore fails to teach that the transport device described for transferring the substrate between treatment chambers should provide a suction portion to suction and hold the surface targeted for holding, which is opposite the surface targeted for treatment. Nakamura further fails to explicitly indicate that transport device (855) comprises a guide component for guiding the holding portion in the carrying direction and a driving portion for transferring the holding portion along the guide component. Goodwin teaches a wafer handling system including a pair of robot arms and a drive portion with a plurality of ports providing a lifting action for a substrate by utilizing the Bernoulli principle. The device provides "low pressure" or a suction between the device and the surface of the substrate without contacting the substrate. It would have been obvious to one of ordinary skill in the art at the time of the invention to utilize a handling system in

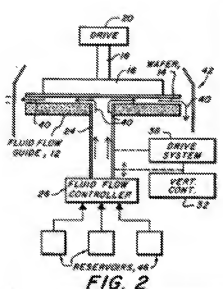
Art Unit: 1791

accord with the Goodwin apparatus as the transport device in the Nakamura process. This would have been an obvious substitution to anyone seeking to minimize the possibility of damaging a fragile substrate by direct contact with the handling system or transport device.

Claims 1, 2, 4, 6, and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cady (US 4,544,446) in view of Mitsumori (US 6,230,722 B1).

With particular reference to the instant reference figure 2 (see below), Cady teaches a treatment device for subjecting a surface of a substrate targeted for treatments to continuous plural types of treatments. Specifically, the reference teaches a substrate carrier (16) with treatment units (46).

As clearly depicted in the figure, the substrate surface targeted for treatment faces downward and the plural treatment units are operated upward to treat said targeted surface. A suction portion (16) or "vacuum chuck" holds a "surface targeted for holding" opposite the surface targeted for treatment and said suction portion is further interconnected with "a guide component" (18) and "a driving portion" (20) [Claim 2]. It is further evident that the fluid having been applied to the surface falls away (40) after having been applied to the surface.



With reference to the above figure, Cady sets forth that "it will be appreciated that the entire apparatus may be inverted such that the wafer is suspended from the top via vacuum chuck 16. The inverted system has the advantages of protecting the surface of the substrate from being contaminated by any particulates in the air falling from above, particularly during the loading and unloading steps. In addition, this configuration keeps all chemicals, and liquids and components in one location at the bottom of the reactor. Thus, during removal of the substrate, there is no accidental dripping of liquid on the newly cleansed or processed substrate. It will, of course, be appreciated that the chemicals must be placed under pressure in order to provide for the flow indicated by arrows 40." (Column 8, Lines 26-40)

The reference continues by teaching several processing steps widely recognized as conventional operations within the field of semiconductor processing. Specifically , Example 1 teaches wafer cleaning, Example 2 teaches a photoresist development step, Example 3 teaches a silica etching step, and Example 4 teaches a resist stripping step

(Column 12, line 25 to Column 13, line 67). Although the reference indicates that "many of the above operations (e.g. Example 1 through 4) can be done sequentially without removal of the wafer (from the fluid flow guides)" it does not explicitly require separate treatment units arranged side by side "along a carrying direction of the substrate" as claimed.

To this end, it is the Examiners position that providing a separate treatment unit (e.g. fig 2) for each of the disclosed conventional processing operations (examples 1 to 4) would be a merely obvious extension over the Cady teachings for one having an ordinary level of skill in the art of automated semiconductor processing (e.g. cassette-to-cassette process equipment). Specifically, this modification would be an obvious choice for anyone seeking to prevent cross contamination of sequential treatment fluids that may occur during sequential treatments in a single treatment unit. It would further be obvious, absent any compelling and unexpected results to the contrary, for one of ordinary skill to arrange these separate treatment units in any manner deemed most to the end user including "along a carrying direction of the substrate".

While Cady sets forth the fundamental process steps in accord with the claimed invention and an apparatus for the performance of these steps, the reference fails to explicitly teach the particular details of the cleaning treatment unit as presently claimed.

Mitsumori teaches a wet treatment method and apparatus for treatment of "large-sized substrates such as ... a substrate for liquid crystal" (Column 1, lines 14-17) which

Art Unit: 1791

one of ordinary skill would recognize as directly relevant to the Cady teachings.

Mitsumori teaches a variety of “fluid saving type fluid feed nozzles” including a particular embodiment (see fig 1 excerpt below) which comprises an introducing path (10) and discharge path (12). The reference indicates that the angle of incidence between the introducing or discharge path and the substrate (1), θ_1 and θ_2 respectively, can each be varied between 0 and 90° (Column 14, lines 3-8). Where the discharge path or “recovery path” presents a $\theta_2 = 90^\circ$, the nozzle is understood to present a recovery path formed by an inclined end surface of the nozzle (18) and an opposite surface (e.g. discharge path (12) wall which is distal from introducing path (10)) which is perpendicular to the surface targeted for treatment (1). Mitsumori further teaches the inclusion of inner extensions (270) or first and second top end surfaces. Combination of these features, namely a recovery path perpendicular to the substrate surface and the inner extensions (270) has been set forth explicitly above.

FIG. 1

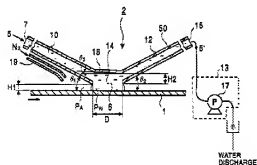
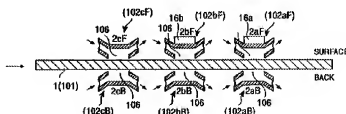


FIG. 11A



Mitsumori teaches that a sensor measures the distance between the nozzle and the substrate and provides feedback measurements to an actuator which provides for a

Art Unit: 1791

constant separation distance (H1) (Column 14, lines 35-51). From the foregoing, it is understood that the "top end surfaces" of the nozzle are "disposed with a predetermined gap from the surface targeted for treatment". Finally, the reference teaches that the nozzle includes a pressure controller(13) which "comprises a reduced pressure pump provided on the discharging port side (15) (Column 13, lines 16-17). The provision of a reduced pressure pump is understood to encompass Applicants embodiment wherein "the recovery path is evacuated to a pressure that is less than atmospheric pressure"

As depicted in the instant reference Figure 11A, Mitsumori disclosed particular embodiments wherein the surface targeted for treatment faces downward and wherein the nozzle is operated to apply treatment in an upward facing direction. Further Mitsumori teaches that the disclosed nozzle provides substrate treatment with "under a tenth the conventional consumption, and allow to obtain a higher cleanliness than conventional one". In accordance with the Mitsumori disclosure, it would have been obvious to one of ordinary skill in the art at the time of the invention to substitute the disclosed fluid flow guide (12) in Cady with the "fluid saving feed nozzle" disclosed by Mitsumori. This modification would have been obvious to one of ordinary skill in the art seeking to reduce reagent consumption and to reduce substrate contamination.

Response to Arguments

Applicant's arguments with respect to **claims 1, 2, 4, 6, and 8** have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JASON L. LAZORCIK whose telephone number is (571)272-2217. The examiner can normally be reached on Monday through Friday 8:30 am to 5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Steven Griffin can be reached on (571) 272-1189. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 1791

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Steven P. Griffin/
Supervisory Patent Examiner, Art Unit 1791

JLL

Application Number**Application/Control No.**

10/783,979

**Applicant(s)/Patent under
Reexamination**

ASUKE ET AL.

Examiner

JASON L. LAZORCIK

Art Unit

1791